DOCUMENT RESUME

ED 133 063 PS 009 002

AUTHOR	Lane, Elizabeth M., Ed.
TITLE	Psychological Evaluation of ECE, FY 1977.
INSTITUTION	Dayton Public Schools, Ohio.
SPONS AGENCY	Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE	76
NOTE	54p.
EDRS PRICE	MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS	Academic Achievement; Behavioral Objectives; Disadvantaged Youth; *Early Childhood Education; *Educational Assessment; Grade 1; Grade 2; *Intervention; Kindergarten Children; Learning Readiness; Longitudinal Studies; *Preschool Evaluation; Preschool Programs; *Primary Education; *Program Evaluation; Psychological Evaluation; Socioeconomic Status
IDENTIFIERS	Elementary Secondary Education Act Title I; ESEA Title I; *Ohio (Dayton)

ABSTRACT

Results of a 9-year assessment of the Dayton Public School Early Childhood Education Program are presented in this report: findings for the school year 1975-76 are reviewed in detail and studies of the preceding eight years are summarized. The 1060 participants enrolled at 32 different centers in 1975-76 were 4- and 5-year-olds, predominantly from socioeconomically disadvantaged families, as were those involved in the earlier programs. A new set of measurement techniques was adopted in 1975-76, with a total of 94 target behaviors encompassing nine broad skill areas used to evaluate program impact in a criterion-referenced approach. In addition, two other criterion tasks, the Walker Readiness Test for Disadvantaged Preschool Children and the Caldwell Preschool Inventory were selected to measure program effectiveness. All these tasks revealed significant gains. Results of the nine years of evaluation support the program as effective in early remediation and prevention, as long as it is followed by other programs which reinforce the skills and learning acquired. Strong supportive evidence is presented of the effectiveness of early childhood education upon kindergarten performance. Most first grade results indicate continued superior performance of children with preschool training, but by second grade, impact of the preschool program has been weakened. Considering the many uncontrolled, possibly influential variables intervening during kindergarten and the early primary years, it is seen as significant that the program has had such measurable relatively long-term effects. (Author/BF)

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ED133063

PSYCHOLOGICAL EVALUATION OF ECE FY 1977

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PS 009002

PSYCHOLOGICAL EVALUATION

A COMPONENT OF EARLY CHILDHOOD EDUCATION PROGRAM
ESEA TITLE I, FY 1976

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EARLY CHILDHOOD EDUCATION PROGRAM EVALUATION

The Early Childhood Education Program in the Dayton Public Schools had completed its eleventh year of operation when this evaluation was conducted in the Fall of 1975 and the early Summer of 1976.

The ECE Program had opened in September 1965, with a pilot program in four schools identified as having significantly large populations of socio-economically disadvantaged families. The number was increased to sixteen in March 1966 and has at times, since then, exceeded thirty centers. From the beginning, funding has been from ESEA Title I.

As was noted in last year's report, the evaluation of the 1974-75 school year represented the final product of the program assessment model initiated in 1968-69. That plan was designed to measure both the short and long-term impacts of the program on selected aspects of children's performances. For at least eight years a sample of children currently enrolled in the ECE Program was subjected to individual, in-depth evaluations conducted by school psychologists while, beginning three years ago, two additional measures were obtained on every child in the program through assessments done by the ECE staff.

With the year just completed, the more extensive, in-depth studies were terminated because of a mandated shift in the program to specific behavioral objectives. Data on the behavioral objectives will be presented along with analyses of the two other measures and the continued assessment of the longer term effects of the ECE Program, viz., in kindergarten and the first and second grades.

The following outline summarizes the school years and the groups that were evaluated during those time periods:

9 EVALUATION CYCLES, DAYTON EARLY CHILDHOOD EDUCATION PROGRAM, 1967-68 THROUGH 1975-76

	SCHOOL YEARS FOR LEVELS OF EVALUATION			
Cycle	Early Childhood Education Evaluation	Kindergarten Evaluation	First Grade Evaluation	Second Grade Evaluation
1st	1967-68	1968-69	1969-70	1970-71
2nd	1968-69	1969-70	1970-71	....
3rd	1969-70	1970-71	1971-72	1972-73
4th	1970-71	1971-72	1972-73	....
5th	1971-72	1972-73	....	1974-75
6th	1972-73	1973-74	1974-75	1975-76
7th	1973-74	1974-75	1975-76	
8th	1974-75	1975-76		
9th	1975-76			

.... No Data Available

The data from the ECE Program itself and from the follow-up groups in kindergarten and the first and second grades will illustrate again, as they have repeatedly, the chronic problem of the high attrition rate over even short time periods. The program continues to draw most of its participants from lower socio-economic groups which in general are characterized by relatively high mobility (both within and out of the district), and high rates of absenteeism. Losses in initial samples have typically been quite high and by the end of the study period in the second grade have shrunk to a fraction of the original sample.

I. EVALUATION OF ECE ENROLLEES

During the 1975-76 school year, a total of 1,060 four and five-year-old children was enrolled at one time or another in the Dayton ECE Program. These children attended either morning or afternoon classes in 32 different Centers: 29 Pre-Kindergarten and 3 All-Day Kindergarten. The enrollment figure is somewhat smaller this year because of the elimination of all three-year-olds in the program by State directive.

As noted in the introduction, a major facet of the program evaluation was also eliminated because of the shift to specific behavioral objectives. In previous years a random sampling of children was carried out in each of the Pre-Kindergarten Centers, each of whom was then administered eight different criterion tasks by school psychologists. These particular criterion tasks were chosen because they measured skills and experiences provided in the ECE Program but tasks which were not taught directly by the Program.

As also indicated, two criterion tasks were administered individually to every child and those were continued this year to comprise the major outcome measures in addition to the specific behavioral measures. The Walker Readiness Test for Disadvantaged Pre-School Children (1) had been employed for four previous years. The results had been used to select children for admission to the program since the 1972-73 school year when a qualifying standard or admission was imposed. The Walker Test was administered individually by teachers, consultants, and social workers in early September and again in late May to early June.

The well-known Preschool Inventory - Revised Edition, 1970 developed by Dr. Bettye M. Caldwell (2) was used last year for the first time. It was administered by the lead teachers in mid-October and again in late May for the post-evaluation phase. The time between the pre- and post-evaluations was longer for the Walker than for the Caldwell since the Walker was used as the selection instrument and the Caldwell could not be administered until children had ample opportunities to become adapted to the learning environment.

Description of Tasks and Scoring

The Walker Readiness Test for Disadvantaged Pre-School Children (1) is described as a culture-fair, non-verbal readiness test for rural and urban disadvantaged children, available in two forms: Forms A and B. Each form is divided into four sections: 25 similiarities items, 15 differences items, 5 numerical analogies items, and 5 missing parts items. The items are composed of pictures, figures, and symbols not necessarily associated with any particular kind of culture or environment. The item form is multiple-choice, not requiring reading ability, but testing listening ability, visual acuity, and recognition of similiarities, differences, numerical analogies, and missing parts. The child is required only to point to one of the four choices per item. Scoring is the number of items answered correctly. Percentile ranks for total scores for children of different age levels (in intervals of 6 months) are available for each form.

The Pre-School Inventory is a brief assessment and screening instrument designed for individual use with children in the age range of three to six years. It was developed to give a measure of achievement in areas regarded as necessary for success in school. It is not considered culture free. In fact, one aim in its development was to provide educators with an instrument that would permit them to "highlight the degree of disadvantage which a child from a deprived background has at the time of entering school so that any observed deficits might be reduced or eliminated." (2, p.4) A further goal was the development of an instrument that was sensitive to experience and could be used to demonstrate changes associated with educational intervention. The instrument consists of 64 items covering four general areas, identified factorially as: Personal-Social Responsiveness, Associative Vocabulary, Concept Activation-Numerical and Concept Activation-Sensory. Scoring is the number of items answered correctly.

A total of 94 target behaviors encompassing 9 broad skills' areas was also chosen to evaluate the impact of the program. A copy of the specific behaviors and the evaluation record is included as Appendix A. Teachers were asked to rate each child on each specific behavior shortly after the program began when they had sufficient opportunity to become acquainted with and to observe each child to make valid ratings. The same procedure was also carried out at the conclusion of the program but only the post ratings were used in the analyses because of the unanticipated volume and complexity of the tabulations which became prohibitive since all tabulations had to be performed manually.

Each behavior was rated on a simple four-point scale using frequency and/or consistency of performance as the criterion.

The ratings were defined as:

1) "Performs task all or almost all of the time (90%); reliably; consistently."

2) "Performs task most of the time, usually, some uncertainty or inconsistency (75% of the time)."

3) "50% of the time; inconsistent; less predictable."

4) "25% of the time or less; seldom, very uncertainly."

Essentially the approach was that of a criterion-referenced test evaluation which assesses the child's mastery or non-mastery of certain educational objectives. Educational objectives define intended outcomes of instruction which are generally staced in behavioral or performance terms. The objectives describe what a successful learner will be able to do after appropriate instruction.

Results: Target Behaviors

The post-program results of the specific behaviors expressed in terms of the percentage of all children in the program and the degree to which each objective was met are presented in Table 1. It is clearly impossible to generalize about such a broad array of behaviors except to note the high percentage of children achieving performance levels in the "1" category. The preponderance of the highest rating and the relatively smaller percentage of "3" and "4" ratings, even for very specific items, indicate the high degree to which the performance standards were met.

Areas showing the most significant achievements were physical skills, personal identification, visual skills, expecially naming and matching colors, perceptual skills (forms and shapes), and math skills. Areas of relatively poorer performance included some verbal skills, some visual skills (naming some letters of the alphabet), printing full name, and copying numerals. Overall, it is clear that the majority of the children met almost every behavioral objective to a significant degree.

TABLE 1

RESULTS FOR TARGET BEHAVIORS

Objectives	Percentage of Students and the Degree to Which Each Objective Was Met			
	1	2	3	4
VISUAL SKILLS (continued)				
Name some letters of alphabet	32%	21%	22%	24%
WRITING SKILLS				
Print first name	50%	17%	14%	19%
Print full name	23%	14%	17%	46%
SPATIAL RELATIONS				
Fit objects by plan or pattern	60%	31%	7%	2%
Rearrange objects in space	62%	30%	7%	2%
Describe positions of objects	49%	35%	13%	3%
Locate things in classroom	86%	12%	1%	...
TEMPORAL RELATIONS				
Plan and complete what he plans	55%	39%	5%	1%
Talk in units about past, future	22%	47%	23%	8%
MATH SKILLS				
Vocabulary: big	92%	6%	1%	1%
little	91%	7%	1%	1%
many	61%	22%	10%	7%
few	45%	23%	18%	14%
first	66%	15%	11%	8%
last	55%	16%	16%	13%
middle	63%	19%	9%	9%
more	70%	19%	6%	5%
less	50%	20%	15%	15%
0-5 1-1 matching, concrete	82%	9%	6%	3%
6-10 1-1 matching, concrete	62%	18%	10%	10%
Use number words in counting	81%	11%	5%	3%
After counting objects, tell number	73%	14%	7%	6%
Circle -- match shape	97%	2%	...	...
Square -- " "	96%	3%	1%	...
Triangle -- " "	96%	3%	1%	...
Rectangle -- " "	92%	4%	3%	1%
Other -- " "	84%	4%	5%	7%
Identify circle by name	94%	3%	1%	2%
Identify square by name	85%	7%	3%	5%
Identify triangle by name	84%	8%	4%	4%
Identify rectangle by name	54%	14%	11%	21%
Identify other	27%	12%	16%	44%
Identify 0, numeral by name	68%	7%	5%	20%
Identify 1, numeral by name	84%	4%	2%	10%
Identify 2, numeral by name	73%	6%	6%	15%
Identify 3, numeral by name	69%	6%	7%	18%
Identify 4, numeral by name	65%	6%	9%	20%
Identify 5, numeral by name	63%	7%	10%	20%
Copy numeral: 0	77%	10%	4%	9%
Copy numeral: 1	78%	9%	4%	9%
Copy numeral: 2	40%	15%	15%	29%
Copy numeral: 3	39%	14%	15%	32%
Copy numeral: 4	41%	14%	13%	32%
Copy numeral: 5	34%	12%	15%	39%
Copy numeral: Others	30%	19%	17%	37%

TABLE 1 (continued)

RESULTS FOR TARGET BEHAVIORS

Objectives	Percentage of Students and the Degree to Which Each Objective Was Met			
	1	2	3	4
PHYSICAL DEVELOPMENT				
Balance	74%	23%	2%	...
Identify Part of Body	81%	16%	2%	...
Use Parts of Body	76%	19%	4%	1%
Run	94%	6%	...	...
Jump	92%	7%	1%	...
Hop	80%	16%	3%	1%
Line - Copy shape	95%	4%	...	...
Circle - Copy shape	92%	6%	1%	...
Square - Copy shape	80%	11%	4%	4%
PERSONAL IDENTIFICATION				
Respond to First Name	99.6%	...	...	0
Respond to Full Name	98.5%	1.3%	...	0
State First Name	96.6%	2.6%	...	...
State Full Name	90.5%	6.7%	2%	...
State Age	94%	3%	2%	1%
State Address	48%	17%	17%	17%
VERBAL SKILLS				
Simple Sentence	70%	24%	6%	...
State ideas, etc. to peers	67%	27%	6%	...
State ideas, etc. to adults	63%	28%	8%	1%
Describe objects	54%	34%	10%	2%
Events in sequence	42%	35%	18%	4%
Listen, follow directions	51%	37%	10%	2%
Answer questions on what is presented	51%	35%	12%	2%
Identify familiar sounds	67%	25%	7%	1%
Duplicate varying sounds	52%	34%	11%	3%
VISUAL SKILLS				
Recognize printed first name	86%	8%	4%	2%
Recognize printed complete name	65%	18%	11%	6%
Recognize likenesses, differences	61%	31%	7%	1%
Recall what has been seen	61%	32%	7%	1%
Relate pictures to real things	64%	29%	6%	1%
Classify, shape, size, etc.	63%	28%	8%	1%
Match, compare, arrange objects	55%	34%	9%	2%
Red -- by matching	97%	2%	1%	...
Yellow -- "	97%	1%	1%	...
Blue -- "	97%	1%	1%	...
Green -- "	97%	1%	1%	...
Purple -- "	97%	2%	1%	...
Orange -- "	98%	1%	1%	...
Black -- "	98%	1%	1%	...
White -- "	97%	1%	1%	...
Brown -- "	97%	1%	1%	...
Red -- by naming	87%	4%	2%	7%
Yellow -- "	83%	5%	4%	8%
Blue -- "	79%	6%	4%	11%
Green -- "	82%	6%	2%	10%
Purple -- "	77%	5%	5%	12%
Orange -- "	84%	5%	2%	8%
Black -- "	86%	4%	3%	7%
White -- "	83%	5%	3%	9%
Brown -- "	80%	5%	4%	10%

KEY

1 All or almost all (90%) of the time.

2 Usually or much (75%) of the time.

3 Unpredictably or some (50%) of the time.

4 Very uncertainly or seldom (little--25%).

... Less than 1% of students.

0 No students at all.

Walker and Caldwell Results

A random sample of 140 initial enrollees for whom complete pre- and post-tests results on both the Walker and Caldwell were available was drawn from the class lists for analyses. Re-enrollees were omitted from the selection since (1) it has been demonstrated previously that re-enrollees score significantly higher than initial enrollees at the beginning of their second year as a result of their year's experience: and (2) this is the last year that re-enrollees are to be involved in the program with the termination of all three-year-old enrollments.

Results of these analyses are presented in Table 2.

TABLE 2
PRE- AND POST-MEAN SCORES AND MEAN CHANGE SCORES FOR TWO CRITERION TASKS, WALKER AND CALDWELL TESTS, 1975-76

	Walker (Maximum Score = 50)	Caldwell (Maximum Score = 64)
Pre-test Mean	10.6	30.8
Posttest Mean	35.8	50.7
Gain	25.2	19.9

Children in this sample made average gain scores of 25.2 and 19.9 points on the Walker and Caldwell instruments, respectively, to post-program average levels of 35.8 and 50.7. These compare with maximum scores of 50 and 64 for two instruments.

The present pre-school and mean gain results are at variance with previous results as is illustrated in Table 3. However, the samples are not really comparable since the previous groups contained both enrollees and re-enrollees. The inclusion of re-enrollees produces higher pre-school means and decreased mean changes. The post-school means for the samples are very similar, however.

TABLE 3
PRE- AND POST-MEAN COMPARISONS OF SCORES AND MEAN CHANGE SCORES ON WALKER AND CALDWELL, 1973-74 TO 1975-76

	Walker (Maximum Score: 50)			Caldwell (Maximum Score: 64)		
	1973-74	1974-75	1975-76	1973-74	1974-75	1975-76
Pre-test Mean	20.5	20.2	10.6	...	41.1	30.8
Posttest Mean	37.5	36.1	35.8	...	52.4	50.7
Mean Change	17.0	15.9	25.2	...	11.3	19.9

Although the pre-program ratings for the target behaviors could not be used for comparative purposes during this change year because of technical and clerical deficiencies, the post-program results are nevertheless very striking and supportive of the program's effectiveness in achieving those particular objectives. These behavioral objectives receive additional strong back-up from the two more quantitative measures, the Walker and the Caldwell Pre-School Inventory, the latter of which has some elements in common with the target behaviors. Increases of 25 and almost 20 points on the Walker and Caldwell, respectively, represent highly significant gains. Despite the lack of any control group, it seems highly improbable that such gains could be expected only as a function of time/maturation. It is evident that some of the demonstrated gains on the two tests, especially the Walker, are non-cognitive in nature and are due to such critical extra-test factors as improved attention and concentration. In general, children who participate in the ECE Program learn to listen better, to concentrate and attend to instructions, and to assimilate those learned skills in the service of acquiring cognitive skills.

Participating schools in the ECE Program have been selected on the basis of economic need or poverty. Schools are then classified into three (3) priority levels based upon the percentages of low-income students in the schools. Priority I schools are those with the highest percentages of low-income students ranging from 61% to 73% in 1975-76. They include 5 schools and a projected 32% of the children in the program. These are Weaver, McGuffey, Irving, Edison and Children Services.

There are 12 Priority II schools, ranging from 36% to 60% low-income students. These schools included 44% of the children: Jackson Primary, St. James, Troy/Miami Chapel, Emerson, Patterson, Gardendale, Highview, McNary, Westwood, Jefferson Primary and Elementary, Huffman and Wogaman.

Priority III schools, comprised of low-income students ranging from 25% to 34%, include a projected 24% of the children and the following 5 schools: Ruskin, Jane Addams, Carlson, Van Cleve, and Washington.

The greatest concentration and intensity of services is utilized in Priority I target area schools, descending in quantity from first through third priority schools. There is an obvious assumed relationship between the priority levels and educational need as indicated by the heavier concentration of services in the highest priority schools. Accordingly, it would seem of interest to determine whether such a concentration of resources is justified and effective.

Random samples of 30 initial enrollees were drawn from the class lists in the three priority school groupings, using the raw scores for the Walker and the Caldwell, pre- and post-program and the gain scores, as criterion measures. The pre- and post-program mean scores and the gain measures for the Walker are presented in Table 4.

TABLE 4

PRE- AND POST PROGRAM MEAN SCORES AND MEAN CHANGE SCORES FOR PRIORITY GROUPS ON THE WALKER TEST

Priority Groups of ECE Schools	Pre-School Mean	Post-School Mean	Mean Change
Priority I	9.74	30.07	20.33
Priority II	10.17	37.00	26.83
Priority III	11.63	37.43	25.80

The ANOVA for the gain or difference scores on the Walker for the 3 groups is presented in Table 5.

TABLE 5

ANALYSIS OF VARIANCE FOR WALKER TEST GAIN SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Between Groups	732.02	2	366.01	6.02
Within Groups	5,287.62	87	60.78	
TOTAL	6,019.64	89		

It is evident from an inspection of these two tables that the Priority I schools make the lowest average gain and that their average post-program score is also lower than the other two priority groups despite the fact that the pre-program scores are about equivalent.

In order to test the differences between the three gain score means, Duncan's New Multiple Range Test was applied. These results are presented in Table 6.

TABLE 6

DUNCAN'S MULTIPLE RANGE TEST FOR WALKER TEST GAIN SCORES FOR THREE PRIORITY GROUP SCHOOLS

Means	Priority I 20.33	Priority II 26.83	Priority III 25.80	Shortest Significant Ranges
I: 20.33	...	6.50 **	5.47 **	R_2 = 5.31
II: 26.83		1.03	...	R_3 = 5.52
III: 25.80				

α = .01

Both the means for the Priority II and Priority III schools differ significantly (α = .01) from the mean of the Priority I schools, but do not differ from each other.

The pre- and post-program scores and the mean gain scores for the Caldwell (Pre-School Inventory) are presented in Table 7.

TABLE 7

PRE- AND POST-PROGRAM MEAN SCORES AND MEAN CHANGE SCORES FOR PRIORITY GROUP SCHOOLS ON THE CALDWELL INVENTORY

Priority Groups of ECE Schools	Pre-School Mean	Post-School Mean	Mean Change
Priority I	27.96	45.73	17.77
Priority II	27.53	50.90	23.37
Priority III	34.10	52.87	18.77

The AVOVA for the gain or difference scores on the Caldwell for the 3 groups is presented in Table 8.

TABLE 8
ANALYSIS OF VARIANCE OF CALDWELL INVENTORY GAIN SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Between Groups	535.20	2	267.60	6.2121 **
Within Groups	3,747.69	87	43.08	
TOTAL	4,282.89	89		

** $p < .01$

It is evident from an inspection of these two tables that on the Caldwell, too, the Priority I schools make the lowest average gain and that their average post-program score is also lower than the other two priority groups. In order to test the differences between the gain score means, Duncan's Test was used again. These results are presented in Table 9.

TABLE 9
DUNCAN'S MULTIPLE RANGE TEST FOR CALDWELL INVENTORY GAIN SCORES FOR THREE PRIORITY GROUP SCHOOLS

Means	Priority I 17.77	Priority II 23.37	Priority III 18.77	Shortest Significant Ranges
I: 17.77	...	5.66 **	1.00	$R_2 = 4.49$
II: 23.37		4.60 **	...	$R_3 = 4.57$
III: 18.77		...		

$\alpha = .01$

The mean for the Priority I schools differs significantly from Priority II, but does not differ significantly from the mean for Priority III, while the mean for Priority III schools also differs significantly from the mean for Priority II.

The preliminary, limited conclusions based upon this initial analysis and limited to only two criterion measures suggest: 1) children in Priority I schools do not necessarily appear to demonstrate greater educational needs in some skills areas than either of the other groups, but where differences do exist, they are greater between Groups I and II then between I and III; and 2) children in

Priority I schools appear to profit relatively less than children in the other two priority groups, depending upon the particular groups of skills being measured, in spite of a greater intensity of services for Priority I schools. However, these conclusions are supported by very limited data and are offered at this time primarily as hypotheses for future testing and must be regarded with considerable caution.

II. KINDERGARTEN EVALUATION

The same assessment plan which was initiated for the kindergarten evaluation 7 years ago was continued again this year. It is of the greatest significance to determine whether the effects of the ECE Program carry over into kindergarten and into subsequent years and, if not, to attempt to explain why.

Children from 20 different schools, all within the Dayton School District, were used in the pre- and post-kindergarten evaluations. Children from other schools were evaluated, but absenteeism, equating the cell entry sizes, and other factors reduced the usable sample to these 20 schools. Schools providing children for the pre- and post-evaluations from both the experimental (ECE children) and control (non-ECE) groups were:

Emerson	Patterson	Gardendale	Jackson	Wogaman
Franklin	Ruskin	Van Cleve	McNary	Residence Park
Huffman	Washington	Edison	Weaver	Jefferson
McGuffey	Addams	Highview	Westwood	Troy

Control children, i.e., children not in the ECE Program or other preschool program in their pre-kindergarten years, were obtained from the same or similar schools, thus considering the relevant characteristics of general socio-economic background and racial composition. It has continued to be very difficult to obtain a true "uncontaminated" control population from among the Title I schools or similar schools since so many children have been involved in day-care or related programs. Every effort was made by the evaluators to eliminate such children, but it cannot be stated with a high degree of confidence that no such children were included in the control sample.

The factors which have traditionally been of interest and which entered into the experimental design in most of the previous years have been sex, race, and whether or not the child had been enrolled in the ECE Program. However, the unequal number of children available in the planned 8 categories (cells) required a compromise of the design or loss of a very significant amount of

data simply to maintain equal numbers in each of the cells. It was felt to be more important to save data than to maintain the three variables since the sample sizes shrink appreciably from year to year. Of the three variables, the variable of sex was judged to be of least importance. Thus, four categories or cells (white ECE, white No-ECE, black ECE and black No-ECE) were used in both pre- and post-kindergarten analyses. As was done last year, the children used in the pre-kindergarten analysis were chosen after the post-kindergarten testing had been completed in order to use the identical children in both analyses.

Description of Tests and Scoring

The same considerations entered into the selection of tests for the kindergarten level as in previous years:

1) Group as opposed to individual administration because of personnel limitations.

2) Length of testing time available because of classroom restrictions and ability to maintain children's attention and interest.

3) Utilization of the same tests from previous years to facilitate comparisons.

Personnel limitations made it impractical to administer more than a single test for each of the two evaluations, and each of the tests had to be of a type which could be managed by persons with less than professional psychological testing training. The tests were administered primarily by the ECE teacher consultants and social workers, most of whom, by the time of the present evaluation, had already administered each of the two tests selected on 7 previous occasions and were thus very well acquainted with the tests and with the problems of managing a group administration with five and six-year-olds.

Children were tested in small groups, usually of 5 to 6 children, within a two to three week period in October, 1975, and within a similar time period in early June, 1976. Approximately 7 months intervened between the 2 test administrations.

The Kuhlmann-Anderson Test, 7th Edition, Booklet K, Revised 1965, was again used for the Pre-Kindergarten evaluation. It is generally viewed as an "intellignece test" and provides an IQ which is defined as "an index of the degree of a pupil's mental ability, or academic potential, in comparison with a representative sampling of pupils of the same chronological age."

The test consists of eight parts, each of which provides a score, but IQ's and other standard measurements are provided only for the total score. The test involves picture completion, locating the incorrect part in a picture, classifying objects which belong together, identifying objects which fit various orally described specifications, completing designs, matching figures, counting, and following directions.

The Metropolitan Readiness Tests, Form A, 1965, were used for the terminal evaluation. They measure the extent to which school beginners have developed the several skills and abilities that contribute to readiness for first grade instruction. Six tests are included in the Metropolitan Readiness Test:

1. Word Meaning, a 16-item picture vocabulary test.
2. Listening, a 15-item test of the ability to comprehend phrases and sentences instead of individual words.
3. Matching, a 14-item test of visual perception, involving the recognition of similarities.
4. Alphabet, a 16-item test of the ability to recognize the lower-case letters of the alphabet.
5. Numbers, a 26-item test of number knowledge.
6. Copying, a 14-item test which measures a combination of visual perception and motor control.

Conversion scores are provided on each of the 6 sub-tests and for the total, but percentile ranks and stanines are provided only for the total score.

Results: Kuhlmann-Anderson Test

The data for both the initial and post-kindergarten evaluation were analyzed using ANOVA in a 2 x 2 fixed factor design. IQ's were used as cell entries for the Kuhlmann-Anderson and unconverted scores for the Metropolitan. One hundred (100) children were used for both analyses. Children who had missed more than 40 days of school were eliminated from the analyses.

The ANOVA for the Kuhlmann-Anderson results is presented in Table 10. Reference to the table reveals two significant F-ratios, associated with the main effects of school and race. The F of 30.21 for the school factor is

TABLE 10

ANALYSIS OF VARIANCE OF KUHLMANN-ANDERSON TEST SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	841.00	1	841.00	8 46 **
School	3,003.04	1	3,003.04	30.21 ***
Race x School	51.81	1	51.81	...
Within	9,543.99	96	99.42	
TOTAL	13,439.85	99		

** $p < .01$
*** $p < .001$

highly significant (1, 96 df., $F = 6.90$, $p < .01$) at the .001 level and that for race significant at the .01 level. The mean difference of 11 IQ points on the school factor is once again interpreted as supporting the effectiveness of the ECE Program on the development of the types of intellectual skills as measured by the Kuhlmann-Anderson. This difference indicates that children who have participated in the ECE Program enter kindergarten functioning at a significantly higher level of intellectual/cognitive development than children who have not participated in it.

Table 11

MEAN IQ'S OF BEGINNING KINDERGARTEN CHILDREN WITH AND WITHOUT ECE TRAINING, AS MEASURED BY THE KUHLMANN ANDERSON TEST

School Year	ECE Training in Pre-Kindergarten	Without ECE Training	Difference in Points	TOTAL GROUP
1968-69	92.1	86.2	5.9 **	89.1
1969-70	90.1	89.7	0.4	90.0
1970-71	98.3	87.9	10.4 ***	93.1
1971-72	95.9	85.8	10.1 ***	90.9
1972-73	97.4	89.1	8.3 ***	93.3
1973-74	98.9	89.5	9.4 ***	94.2
1974-75	99.1	94.8	4.3 **	97.2
1975-76	101.5	90.5	11.0 ***	96.0

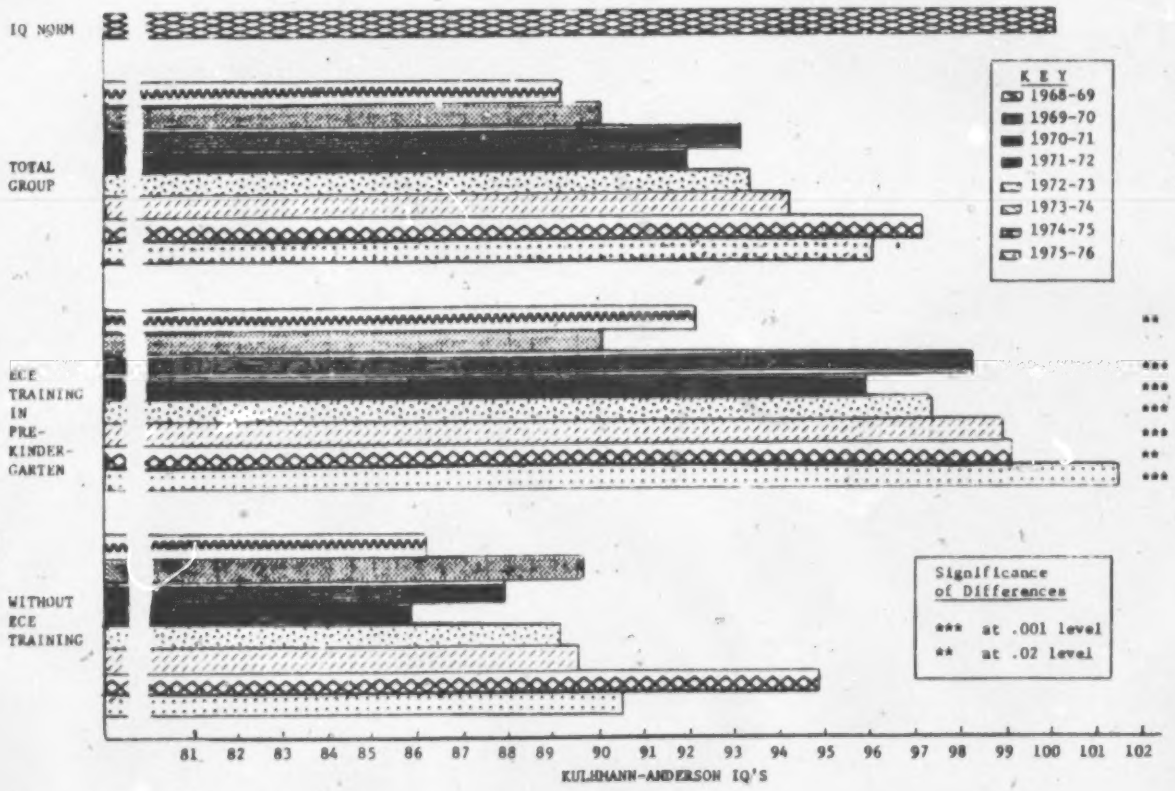
*** Significant at .001 level ** Significant at .02 level

The present results are generally consistent with the Kuhlmann-Anderson findings in 6 of the 11 earlier analyses and strongly support the previous assertion about the effectiveness of the ECE Program on the skills measured. The results of the 8 cycles of the Kuhlmann-Anderson are presented in Table 11. The information for the 8 cycles is also shown in graphic form in Figure 1,

in which it is clearly evident that the kindergarteners of 1975-76 surpassed the earlier cycles.

The results over the eight years for the ECE and No-ECE groups and for the total group are very consistent, particularly since the 1970-71 year.

Figure 1. MEAN IQ'S OF BEGINNING KINDERGARTEN CHILDREN WITH AND WITHOUT ECE TRAINING COMPARED TO IQ'S OF TOTAL GROUP TESTED, 1968-69 TO 1975-76



The significant race factor is associated with means of 98.9 and 93.1 for white and black children, respectively. The present finding of a racial difference in performance on the Kuhlmann-Anderson marks the fourth time in the evaluation series that such results have been obtained.

Inspection and comparison of the cell means showed consistent differences between the four race-school combinations. The mean IQ's of these four combinations are presented in Table 12 along with percentiles and stanines.

TABLE 12

RACE-SCHOOL IQ SCORE COMBINATIONS ON KUHLMANN-ANDERSON TEST, OCTOBER 1975

Race	ECE Training in Pre-Kindergarten			Without ECE Training In Kindergarten		
	Mean	Percentile	Stanine	Mean	Percentile	Stanine
White	103.6	58	6	94.1	35	4
Black	99.3	48	5	86.9	20	3

Results: Metropolitan Readiness Tests

The ANOVA's for the Metropolitan Tests are presented in Tables 13-19. Table 13 presents the results of the total Metropolitan scores, while the other tables contain the analyses of the 6 parts which comprise the total score.

Reference to Table 13, the results for the total score, reveals two minimally significant F-ratios associated with the main effects of school and race (1, 96 d.f., $F = 3.94$, $p < .05$ and $F = 6.90$, $p < .01$). The means associated with the race factor are 59.6 and 54.1 for white and black children, respectively, significant at the .05 level. The better performance on the total Metropolitan of white children as compared with black children is consistent with the earlier results on the Kuhlmann-Anderson and also with the results of the last two years.

The difference of 5.8 points (59.7 and 53.9 for ECE and Non-ECE groups respectively) between the two groups is generally consistent with the results of the years since the 1970-71 cycle when a significant difference was first attained. While the significance level is lower, it does re-establish the pattern of significant findings at the post-kindergarten level after the insignificant results last year. Table 20 summarizes these findings.

After 2 years of insignificant results, the first significant results on the post-kindergarten evaluation occurred in the 1970-71 school year. At that time the Dayton City School District initiated a city-wide, systematic,

TABLE 13
ANALYSIS OF VARIANCE OF METROPOLITAN TOTAL SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	778.41	1	778.41	5.28 *
School	858.49	1	858.49	5.82 *
Race x School	7.29	1	7.29	...
Within	14,159.04	96	147.49	
TOTAL	15,803.23	99		

* $p < .05$

TABLE 14
ANALYSIS OF VARIANCE OF METROPOLITAN WORD MEANING SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	34.81	1	34.81	6.12 *
School	6.25	1	6.25	1.10
Race x School	3.61	1	3.61	...
Within	545.91	96	5.69	
TOTAL	590.58	99		

* $p < .05$

TABLE 15
ANALYSIS OF VARIANCEOF METROPOLITAN LISTENING SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	3.61	1	3.61	...
School	53.29	1	53.29	10.88 **
Race x School	0.49	1	0.49	...
Within	469.99	96	4.90	
TOTAL	527.38	99		

** $p < .01$

TABLE 16
ANALYSIS OF VARIANCE OF METROPOLITAN MATCHING SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	56.25	1	56.25	7.41 **
School	26.01	1	26.01	3.43
Race x School	0.25	1	0.25	...
Within	728.87	96	7.59	
TOTAL	811.38	99		

** $p < .01$

TABLE 17
ANALYSIS OF VARIANCE OF METROPOLITAN ALPHABET SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	4.41	1	4.41	...
School	1.69	1	1.69	...
Race x School	5.29	1	5.29	...
Within	1,044.31	96	10.88	
TOTAL	1,055.70	99		

TABLE 18
ANALYSIS OF VARIANCE OF METROPOLITAN NUMBERS SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	70.56	1	70.56	4.65 *
School	54.76	1	54.76	3.61
Race x School	4.84	1	4.84	...
Within	1,456.47	96	15.17	
TOTAL	1,586.63	99		

* $p < .05$

TABLE 19
ANALYSIS OF VARIANCE OF METROPOLITAN COPYING SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	10.24	1	10.24	...
School	7.84	1	7.84	...
Race x School	0.99	1	0.99	...
Within	1,169.27	96	12.18	
TOTAL	1,188.35	99		

TABLE 20

MEAN POINT SCORES OF COMPLETING KINDERGARTEN CHILDREN WITH AND WITHOUT ECE TRAINING AS MEASURED BY THE METROPOLITAN READINESS TESTS

School Year	With ECE Training	Without ECE	Difference
1968-69	37.7	33.8	3.9
1969-70	49.1	45.2	3.9
1970-71	61.6	51.4	10.2 ***
1971-72	64.5	45.6	18.9 ***
1972-73	58.8	52.3	6.5 **
1973-74	59.1	50.0	9.1 **
1974-75	56.9	55.0	1.9
1975-76	59.7	53.9	5.8 *

*** Significant at the .001 level ** Significant at the .01 level
* Significant at the .05 level

programmed approach to the development of reading, utilizing several of the well-known reading programs: Sullivan, Lippincott, Distar, etc. Kindergarten children were included in these programs and it was hypothesized at that time that the sudden shift in outcome was attributable to a planned, systematic approach in the "language arts", geared to children's individual educational needs. The importance of continuous and appropriately sequenced reinforcement following ECE was stressed. Positive results in 3 subsequent cycles, in 1971-72, 1972-73 and 1973-74, offered additional support for the thesis that ECE children were apparently being picked up at their individual levels and were being provided with individually tailored programs, reinforcing the skills and learning that had occurred in the ECE program.

After 4 consecutive years of positive results, the sudden reappearance of negative findings last year was both unexpected and caused considerable speculation. It was suggested at the time that increased teaching responsibilities might have made it increasingly difficult for teachers to individualize instructional plans and to meet the highly variable educational needs of children.

Failure to provide "continuous and appropriately sequenced reinforcement in the grades is vitally important if the child is to maintain these gains throughout his school experience." (3, p. 3)

The results this year are minimally significant and positive, but also show a considerable decline when compared with the pre-kindergarten results on the Kuhlmann-Anderson. The inconsistent and somewhat unpredictable results of the past two years do not lend themselves to any easy conclusions or ones in which one can have much confidence. Their potential meaning is related at least to the outcome of the next year's evaluation and perhaps to several more cycles. At the moment it is not possible to know whether last year's speculations were valid. The results of the 1976-77 school year will be viewed with great anticipation.

It should be noted that there were only four significant F-ratios among the 6 sub-tests, 3 of which were associated with the race factor (Word Meaning, Matching, and Numbers) and one associated with the school factor (Listening).

TABLE 21

MEAN SCORES AND MEAN DIFFERENCES FOR EIGHT KINDERGARTEN CYCLES COMPARED WITH THE STANDARDIZATION MEANS ON THE METROPOLITAN READINESS TEST FOR THE YEARS 1968-69 THROUGH 1975-76

Group	Word Meaning	Listening	Matching	Alphabet	Numbers	Copying
	Sub-Test Kindergarten Means					
Standardization Means	8.67	8.89	7.50	9.39	12.02	6.81
KDG. CYCLE: 1968-69	5.76	8.48	4.80	5.96	7.76	3.10
1969-70	7.44	9.27	6.80	8.87	10.16	4.63
1970-71	8.19	10.11	8.06	12.86	11.40	6.19
1971-72	7.44	9.39	7.55	11.74	10.91	7.80
1972-73	7.45	10.06	7.92	12.78	11.03	6.50
1973-74	7.40	9.30	7.99	13.05	11.14	6.05
1974-75	7.68	9.75	7.45	13.08	11.73	6.29
1975-76	7.71	9.81	8.19	13.27	12.56	5.58
	Sub-Test Mean Differences from Standardization Means					
1968-69	-2.91	-0.41	-2.70	-3.43	-4.26	-3.71
1969-70	-1.23	+0.38	-0.70	-0.52	-1.86	-2.18
1970-71	-0.48	+1.22	-0.36	+3.47	-0.62	-0.62
1971-72	-1.23	+0.05	+0.05	+2.35	-1.11	+0.99
1972-73	-1.22	+1.17	+0.42	+3.39	-0.99	-0.31
1973-74	-1.27	+0.41	+0.49	+3.66	-0.88	-0.76
1974-75	-0.99	+0.86	-0.05	+3.69	-0.29	-0.52
1975-76	-0.96	+0.92	+0.69	+3.88	+0.54	-1.23

Table 21 presents for the Metropolitan the mean scores and mean differences between the total kindergarten group for each of the 8 years and the standardization group.

The present group exceeded the standardization group on four of the sub-tests which is generally consistent with other groups exhibiting significant findings. The 1975-76 school year was the first year that the Kindergarten group mean exceeded the standardization mean in Numbers, although the ECE trained group had been consistent in exceeding this norm for four of five cycles.

Figure 2 presents the 1976 comparative results on the six sub-tests of the Metropolitan Readiness Test. Because of the emphasis on the alphabet in Dayton's kindergartens, both groups greatly exceeded the Standardization Group Mean.

Figure 2. COMPARISON OF METROPOLITAN READINESS SUB-TESTS' MEAN SCORES OF KINDERGARTENERS WHO HAD ECE EXPERIENCE IN PRE-KINDERGARTEN YEAR WITH MEAN SCORES OF KINDERGARTENERS WITHOUT PRE-K SCHOOL EXPERIENCE - MAY 1976

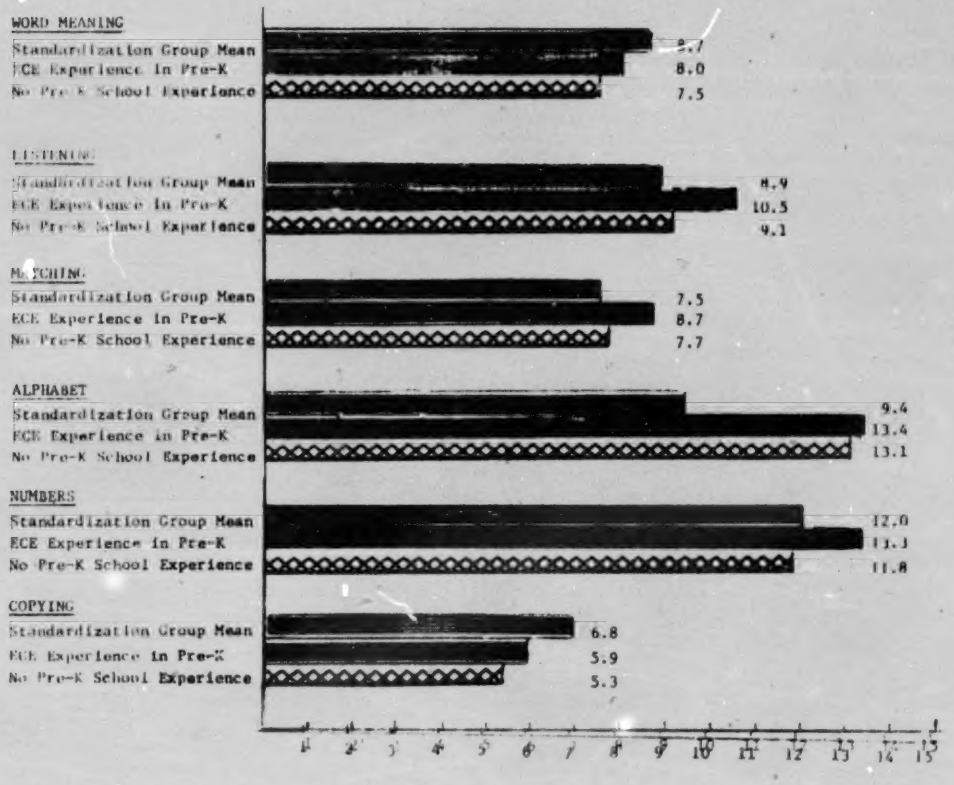


Table 22 presents the mean scores for the past six years for the ECE group only, as compared with the standardization group. With the Non-ECE children

TABLE 22

MEAN SCORES AND MEAN DIFFERENCES FOR KINDERGARTEN GROUPS WITH ECE TRAINING IN PRE-KINDERGARTEN YEAR COMPARED WITH STANDARDIZATION GROUPS ON THE METROPOLITAN READINESS TEST FOR SIX YEARS, 1970-71 THROUGH 1975-76

Group	Word Meaning	Listening	Matching	Alphabet	Numbers	Copying
	Sub-Test Kindergarten Means (ECE Training)					
Standardization Means	8.67	8.89	7.50	9.39	12.02	6.81
KDG. CYCLE:						
1970-71	8.56	10.00	9.06	14.28	12.97	7.06
1971-72	8.38	11.06	9.09	13.53	13.03	7.06
1972-73	8.44	10.63	8.38	13.00	12.09	6.41
1973-74	8.18	9.43	8.60	14.08	12.56	6.80
1974-75	7.68	10.31	7.85	12.89	11.83	6.38
1975-76	7.96	10.54	8.70	13.40	13.30	5.86
	Sub-Test Mean Differences from Standardization Means					
1970-71	-0.11	+1.11	+1.56	+4.89	+0.95	+0.25
1971-72	-0.29	+2.17	+1.59	+4.14	+1.01	+2.60
1972-73	-0.23	+1.74	+0.88	+3.61	+0.07	-0.40
1973-74	-0.49	+0.54	+1.10	+4.69	+0.54	-0.61
1974-75	-0.99	+1.42	+0.35	+3.50	-0.19	-0.43
1975-76	-0.71	+1.65	+1.20	+4.01	+1.28	-0.95

removed, the magnitude of the means on the same sub-tests is increased.

In 1975-76, the ECE-trained group's means exceeded the standardization means on four sub-tests.

Table 23 shows the distribution of "readiness status" scores on the Metropolitan Readiness Tests for the 100 children classified according to whether or not they had ECE experience. Readiness status corresponding to various ranges of total scores is provided in the Metropolitan manual. Table 23 provides brief definitions of the five different readiness states. Those below a score of 24 have a readiness state of "low"; those between scores of 24-44 are regarded as "low normal"; those between 45-63 are regarded as "average"; scores between 64-76 place the person in the "high normal" range; and scores above 76 classify children as superior.

TABLE 23

READINESS STATUS OF KINDERGARTEN CHILDREN WITH AND WITHOUT EARLY CHILDHOOD EDUCATION (ECE) EXPERIENCE ON METROPOLITAN READINESS TESTS, May-June, 1976

Score Range	Interpretation of The Score Range	WITH ECE EXPERIENCE		WITHOUT ECE EXPERIENCE	
		Number	Per Cent	Number	Per Cent
+76	"Apparently very well equipped for first grade work"	5	10%	3	6%
64-76	"Good prospects for success in first grade work"	14	28%	5	10%
45-63	"Likely to succeed in first grade work"	22	44%	33	66%
24-44	"Likely to have difficulty with first grade work"	9	18%	9	18%
Below 24	"Chances of difficulty high under ordinary instructional conditions"	0	0	0	0

A visual analysis of this table indicates that the ECE and No-ECE groups have 41 children each placed in the top three categories ("likely to succeed" or better) although the ECE group has 19 children in the top two categories and the No-ECE group has only 8, 38% vs. 16%. These results suggest that there are qualitative differences of the likelihood to succeed in the first grade even though the total quantitative differences based upon the three categories are the same.

A chi-square analysis was used as a test of significance on the incidence of Metropolitan total scores arranged as follows:

	ECE	No-ECE
Scores 64 up	19	8
45-63	22	33
44 down	9	9

A chi-square of 7.32 was found which, with 2 degrees of freedom, indicates significance at the .05 level ($6.0 = p < .05$). After the two groups of children had all experienced kindergarten for a year, there was a significant relationship between the relatively higher scores of the ECE group and their pre-K training. training.

All-Day Kindergarten

Three All-Day Kindergarten Programs were operated as an extension of the ECE Program during the 1975-76 school year. That number represents a decrease in the number of all-day programs operated through ECE.

Children for this program were chosen on the somewhat ambiguous criteria of educational needs and being likely to "profit most" from such an intensive kindergarten experience. As a result, the groups are not comparable and there are no groups with which to compare the findings. The results must be judged primarily as an effort to help selected individuals by using specialized remedial techniques. It was not set up as a sophisticated experimental program, adhering to principles of experimental design.

The groups were administered the Kuhlmann-Anderson before and after the school year in early October, 1975, and in late May and early June, 1976. Table 24 provides the data for these evaluations.

TABLE 24
PRE- AND POST-MEAN SCORES AND MEAN GAIN SCORES ON THE KUHLMANN-ANDERSON TEST FOR ALL-DAY KINDERGARTEN CHILDREN

School	Pre-School Mean	Post-School Mean	Mean Gain
Edison	96.2	101.4	5.2
Miami Chapel	95.7	98.7	3.0
Van Cleve	80.7	91.4	10.7

Greatest gain was shown in the All-Day Kindergarten whose pre-school mean was lowest, a mean gain of 10.7 points. Judging from this mental maturity measure, the greatest need for the All-Day Kindergarten was at Van Cleve School.

The other two centers began with mean IQ's in the average range and ended with post-school means that approximated the average IQ.

III. FIRST GRADE EVALUATION

In keeping with the assessment model initiated in 1968-69, it was planned to follow children's progress in school so long as it was possible to locate and evaluate a sufficient number each year. Reference to the plan in the first section indicates the 9 ECE cycles and the evaluations accomplished in each of the years. As can be seen, it has not been possible to follow any cycle beyond the second grade because of the high attrition rates and it has only been possible to assess second graders on 3 previous occasions. First graders have been evaluated in 5 previous cycles. It was possible this year to locate and to assess children in both the first and second grades, but not enough third graders could be found to allow a valid assessment.

Description of Test and Scoring

The Short Form Test of Academic Aptitude (SFTAA) - Level 1 was used as the criterion measure for both first and second graders. The test is appropriate for both levels and it was more practical to utilize only one test considering the limitations of the evaluation budget and the relatively small numbers in each of the grades in many of the schools. All testing was done by two graduate psychology students employed especially for this purpose. The examiners did not know which children had been previously enrolled in ECE and which had not.

Children were tested generally in small groups of two to four in their own schools during mid- to late May 1976. Children from the two groups, ECE and Non-ECE, came from the following 21 schools, 20 in the Dayton School District and one outside the District.

Drexel	Washington	Ruskin	Patterson	Emerson
Huffman	Van Cleve	Addams	Lincoln	Highview
Westwood	Fairport	McNary	Carlson	Residence Park
Weaver	Jefferson	Jackson	Wogaman	Gardendale

*Corpus Christi (private school not in Public School system)

One hundred twenty (120) children were used for the post-kindergarten Metropolitan analyses in May 1975. It was possible to utilize 72 of that number for the SFTAA first grade analyses. Many children could not be traced from their last known schools or else had moved out of the District, making it impossible to re-examine them. Even by dropping one of the variables, sex, from the design, it was still necessary to eliminate some data to maintain equal numbers in the categories as required as a condition for statistical analysis.

The SFTAA is one of a series of "mental ability tests" designed for use throughout the school years from grades 1.5 through 12. It is derived from the much longer California Test of Mental Maturity and contains four separately timed sub-tests: Vocabulary, Analogies, Sequences and Memory. Vocabulary and Memory constitute the Language section; while Analogies and Sequences comprise the Non-Language Section. At Level 1, all test items are either pictures, designs, letters or numerals and no reading is required of the student. The test provides separate scores for the two sections and a total score, the latter of which is a separate distribution from those on which the Language and Non-Language derived scores are based. IQ's, one of the three types of normalized standard scores, were used as cell entries.

IQ scores for Language, Non-Language and the Total were analyzed by ANOVA in a 2 x 2 fixed factorial design with race and whether or not the child had previously been in the ECE Program as the 2 factors.

Results

The ANOVA's for the two sections of the SFTAA and the Total score are presented in Tables 25 through 27. Table 25 gives the results of the Total score while the other two tables contain the results of the Language and Non-Language sections. Of major interest is the lack of any significant F-ratios on the Total score or the two sub-sections. The school factor approached minimal significance on both the Total score and on the Non-Language section but, interestingly enough, in both instances it was the Non-ECE group whose mean score exceeded that of the ECE group.

TABLE 25
ANALYSIS OF VARIANCE OF 1ST GRADE SFTAA TOTAL SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	190.13	1	190.13	1.66
School	369.01	1	369.01	3.23
Race x School	300.19	1	300.19	2.63
Within	7,772.55	68	114.30	
TOTAL	8,631.88	71		

TABLE 26
ANALYSIS OF VARIANCE OF 1ST GRADE SFTAA LANGUAGE SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	66.13	1	66.13	...
School	147.35	1	147.35	1.26
Race x School	224.03	1	224.03	1.91
Within	7,982.10	68	117.38	
TOTAL	8,419.60	71		

TABLE 27
ANALYSIS OF VARIANCE OF 1ST GRADE SFTAA NON-LANGUAGE SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	264.50	1	264.50	1.82
School	480.50	1	480.50	3.31
Race x School	320.90	1	320.90	2.21
Within	9,872.01	68	145.18	
TOTAL	10,937.91	71		

These results are actually consistent with the post-kindergarten findings on the Metropolitan last year which failed for the first time in four years to reach significance. This group had entered kindergarten functioning at a higher level than a comparable group of Non-ECE children, but left kindergarten functioning at approximately the same level as measured by the Metropolitan. Thus, it is not unexpected that they should continue to function at an equivalent level at the end of the first grade. These results confirm again the critical importance of kindergarten in determining whether or not children who have been in the ECE Program will be able to maintain their gains.

IV. SECOND GRADE EVALUATION

The group of children used in the second grade evaluation was in the 1972-73 ECE cycle. They were evaluated in kindergarten in 1973-74 and in the first grade last year.

Eighty (80) children were used in the post-kindergarten Metropolitan analyses in 1973-74 and, of that number, 56 were available for the first grade assessment last year. Forty-two (42) of last year's group were located and only two of that number were eliminated in order to maintain equal cell entries. Fourteen (14) children from last year's group could not be located. The variable of sex had already been eliminated last year to conserve data, thus limiting the analyses to two major factors, race, and school.

Children came from the following 18 schools in the Dayton City District and 1 Non-District school:

Emerson	Patterson	Huffman	Ruskin	Washington
Addams	Van Cleve	Allen	Gardendale	Weaver
Edison	Westwood	McGuffey	Troy	Wogaman
McNary	Fairport	*Corpus Christi (Non-District)		

Description of Test and Scoring

As described in the previous section, Section III, the Short Form Test of Academic Aptitude (SFTAA) Level 1, was used as the criterion instrument for evaluating second graders. Description of the test, method of administration, etc., have been outlined in that Section.

Results

The ANOVA's for the two parts of the SFTAA and the Total Score are presented in Tables 28-30. Table 28 gives the results of the Total Score while Tables 29 and 30 provide the results of the Language and Non-Language sections, respectively. Of greatest significance for the purposes of this longitudinal study are the insignificant results associated with the effects of previous ECE

TABLE 28
ANALYSIS OF VARIANCE OF 2ND GRADE SFTAA TOTAL SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	801.02	1	801.02	9.49 **
School	216.23	1	216.23	2.56
Race x School	24.03	1	24.03	...
Within	3,038.10	36	84.39	
TOTAL	4,079.38	39		

** $p < .01$

TABLE 29
ANALYSIS OF VARIANCE OF 2ND GRADE SFTAA LANGUAGE SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	902.50	1	902.50	8.16 **
School	250.00	1	250.00	2.26
Race x School	25.60	1	25.60	...
Within	3,979.40	36	110.54	
TOTAL	5,157.50	39		

** $p < .01$

TABLE 30
ANALYSIS OF VARIANCE OF 2ND GRADE SFTAA NON-LANGUAGE SCORES

Source of Variation	Sum of Squares SS	Degrees of Freedom df	Mean Square	F Ratio F
Race	511.23	1	511.23	4.08
School	65.03	1	65.03	...
Race x School	42.01	1	42.01	...
Within	4,511.49	36	125.32	
TOTAL	5,129.76	39		

exposure on the two parts or the Total Score. There are two significant F-ratios, on the Total Score and on the Language section, both associated with the race factor. In both instances white children scored on the average higher than black children (means of 98.8 and 90.0 for white and black children, respectively, for the Total Score and 99.5 and 90.0 for the Language section). These results are of significance, although not the major focus of this continuing study. Similar findings also occurred last year. It is questionable whether these results represent "true" differences between the two groups. More than likely, they reflect a typical test bias since no claim is made by the test developers that the test is either culture "fair" or "free".

The insignificant results associated with previous ECE experience are at variance with the positive first grade findings last year. This cycle had

previously demonstrated superior performances on entry into and at the conclusion of kindergarten as compared with the Non-ECE group. However, positive results have been obtained only twice in the 5 second grade cycles evaluated using several different criterion tests. First graders have been assessed 6 times with 3 positive outcomes. Unfortunately sequential first and second grade evaluations have occurred on only three occasions. The "histories" of the 9 cycles and the results of each will be reviewed in the Summary Section.

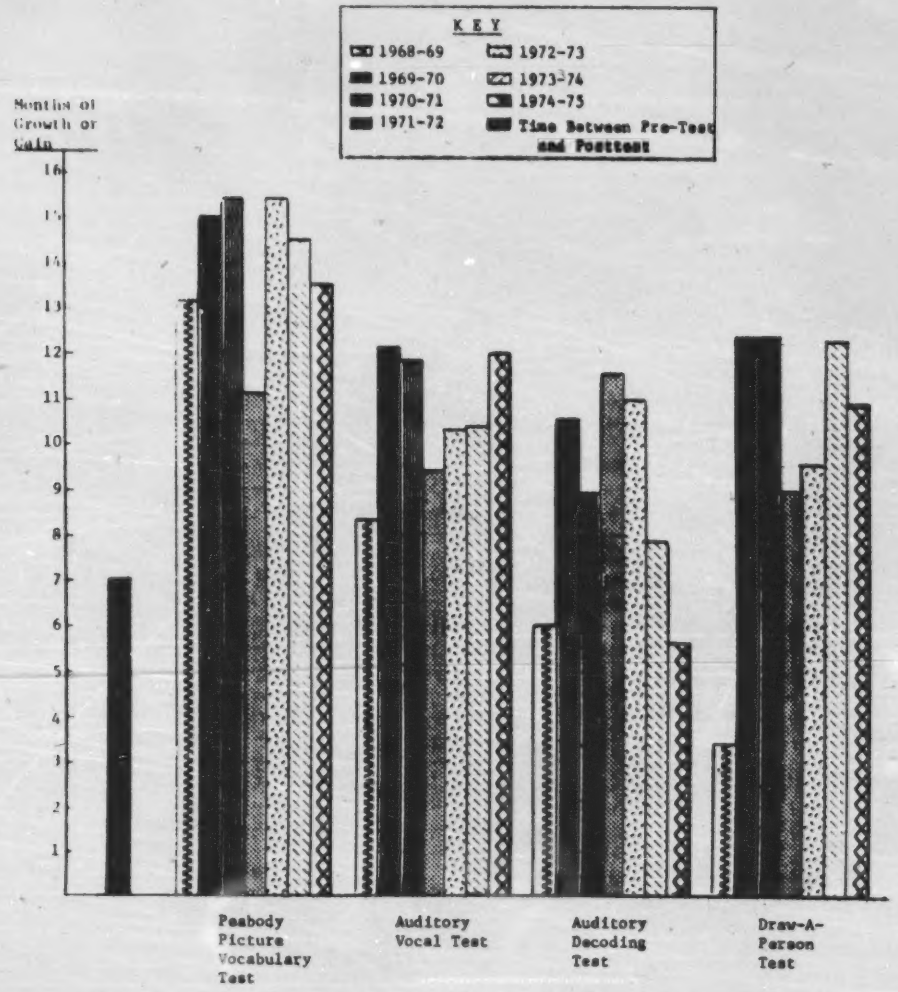
V. SUMMARY

The current evaluation represented a modification of the program assessment model initiated in the 1968-69 school year. That plan was designed to evaluate not only the immediate impact of the ECE program on children then enrolled, but also included a plan to assess whether the program had any lasting effects as these same children progressed through kindergarten and subsequent grades. In view of the wealth of evidence concerning the short-term effects of pre-kindergarten training/education without continued and appropriate assistance to these children through the early grades, an approach which emphasized annual assessments of each cycle as long as possible, has been judged to be necessary and meaningful. The performances of these cycles over the years and the patterns which have developed emphasize the need for replication to establish general principles and understanding. (Refer to Page 2 for the outline of the 9 cycles and the assessments which have taken place.)

Eligibility standards for admission to the ECE Program were changed beginning with the 1972-73 school year. The program was opened to any child of appropriate age living within a Title I school neighborhood whose performance on a selection test met the criterion. Since the first year, the selection cut-off point for admission into the program has become progressively more rigorous. Yet the in-depth studies continued to show mean changes in excess of the expected 7 months' gain, except for the Auditory Decoding Test in 1974-75. (See Figure 3.)

In the year just completed, the more extensive, in-depth studies of a large random sample of children were terminated because of a mandated shift to specific behavioral objectives. A total of 94 target behaviors encompassing 9 broad skills' areas was chosen to evaluate the impact of the program in a criterion-referenced approach. In addition, two other criterion tasks, the

Figure 3. MEAN CHANGES IN MONTHS ON FOUR MEASURES BETWEEN ECE PRE-TEST AND POSTTEST, 1968-69 TO 1974-75, COMPARED TO TIME BETWEEN TESTS



Walker Readiness Test for Disadvantaged Pre-School Children and the Caldwell Pre-School Inventory, were selected to measure the program's effectiveness.

All of these tasks revealed significant gains, supportive of the program's effectiveness in attaining the behavioral objectives and in affecting positively the acquisition of the varied skills measured by the Walker and Caldwell Tasks, viz., Similarities, Differences, Numerical Analogies, Personal-Social Responsiveness, Associative Vocabulary, Concept Activation-Sensory. In addition to the cognitive and personal/social skills acquired, it is evident that some of the recorded gains are a function of greatly enhanced abilities

to attend, to concentrate and to listen actively.

Although real, meaningful gains were recorded during the program, children in the ECE Program, on the average, still function below age expectations on several learned skills. While it has been demonstrated that it is possible for the ECE Program to facilitate children's educational growth well beyond the levels which would be found without any intervention, the program cannot overcome the already existing deficits in such a short time nor can it provide a guarantee of later academic success without changes in the whole education process at subsequent levels. The present and future successes of the program must be measured from the perspective that, from among an already identified educational high risk group, those at the highest risk with the largest skill deficits have been chosen. The most compelling evidence for the effectiveness of the program in improving educational achievements comes from the follow-up results of ECE children in kindergarten and subsequent grades when compared with comparable groups of children without previous ECE experience.

A comparative evaluation of kindergarten children with and without ECE experience was again performed at the beginning and at the conclusion of kindergarten. A statistically significant difference in average performance on the Kuhlmann-Anderson Test was found on admission to kindergarten where the ECE group scored significantly higher than the Non-ECE group. These results are consistent with the findings of 6 previous years and mark the 7th time in 8 years that such results have been found.

After 2 years of insignificant post-kindergarten results in 1968-69 and 1969-70, there followed 4 years of positive findings beginning with the 1970-71 year and continuing through the 1973-74 school year. After 4 consecutive years of superior ECE groups' functioning when compared with the Non-ECE groups, the sudden reappearance of negative findings last year was both unexpected and caused considerable speculation. It was suggested at the time that increased teaching responsibilities and larger class sizes made it increasingly

TABLE 11. OUTCOME HISTORIES OF NINE CYCLES OF EARLY CHILDHOOD EDUCATION, 1967-68 THROUGH 1975-76.

Cycle	ECE Evaluation	KINDERGARTEN EVALUATION		FIRST GRADE EVALUATION	SECOND GRADE EVALUATION
1st	1967-68 Several measures used.	1968-69 Beginning Kuhlmann-Anderson N=120 ECE No-ECE 93.1 86.2 Difference: 5.9 IQ points **Significant p<.02	1968-69 Completion Metropolitan Readiness N=120 ECE No-ECE 37.7 33.8 Difference: 3.9 points Insignificant	1969-70 Completion Clymer-Barrett Reading N=64 Insignificant difference	1970-71 Completion Sullivan-Language N=22 Stanford Achievement N=22 Insignificant for both
2nd	1968-69 Peabody PVT Pre- 40.3 Post 54.0 Diff. 13.7 + Others	1969-70 Beginning Kuhlmann-Anderson N=120 ECE No-ECE 90.1 89.7 Difference: 0.4 IQ points Insignificant	1969-70 Completion Metropolitan Readiness N=120 ECE No-ECE 49.1 45.2 Difference: 3.9 points Insignificant	1970-71 Completion Sullivan Language N=56 SFTAA-Level 1 N=64 Stanford Achievement N=64 All 3 insignificant	1971-72 Completion No second grade data available (Test not administered by the district)
3rd	1969-70 Peabody PVT Pre- 40.0 Post 55.0 Diff. 15.0 + Others	1970-71 Beginning Kuhlmann-Anderson N=144 ECE No-ECE 98.3 87.9 Difference: 10.4 IQ points ***Significant p<.001	1970-71 Completion Metropolitan Readiness N=72 ECE No-ECE 61.6 51.4 Difference: 10.2 points ***Significant p<.001	1971-72 Completion SFTAA N=48 ECE No-ECE Sig. Total 100.8 89.7 *** Non-Lang. 104.1 90.7 *** Language 96.9 90.3 *	1972-73 Completion Stanford Achievement N=32 ECE No-ECE Sig. Wd. Mean. 2.7 2.5 ... Par. Mean. 2.7 2.4 ... Wd. Study 3.3 2.3 **
4th	1970-71 Peabody PVT Pre- 43.8 Post 59.1 Diff. 15.3 + Others	1971-72 Beginning Kuhlmann-Anderson N=96 ECE No-ECE 95.9 85.8 Difference: 10.1 IQ points ***Significant p<.001	1971-72 Completion Metropolitan Readiness N=64 ECE No-ECE 64.5 45.6 Difference: 18.9 points ***Significant p<.001	1972-73 Completion Stanford Achievement N=40 ECE No-ECE Sig. Wd. Mean. 1.9 1.5 ** Par. Mean. 1.9 1.7 ... Vocab. 2.2 2.1 ... Wd. Study 1.9 1.6 * Arith. 2.0 1.7 ...	1973-74 Completion No second grade data available (Test not administered)
5th	1971-72 Peabody PVT Pre- 45.3 Post 56.4 Diff. 11.1 + Others	1972-73 Beginning Kuhlmann-Anderson N=88 ECE No-ECE 97.4 89.1 Difference: 8.2 IQ points ***Significant p<.001	1972-73 Completion Metropolitan Readiness N=64 ECE No-ECE 58.8 52.3 Difference: 6.5 points **Significant p<.01	1973-74 Completion No first grade tests available	1974-75 Completion SFTAA N=36 ECE No-ECE Sig. Total 100.0 90.4 *** Non-Lang. 99.7 92.3 * Language 101.0 90.6 **
6th	1972-73 Peabody PVT Pre- 46.6 Post 61.9 Diff. 15.3 + Others	1973-74 Beginning Kuhlmann-Anderson N=104 ECE No-ECE 98.9 89.5 Difference: 9.4 IQ points ***Significant p<.001	1973-74 Completion Metropolitan Readiness N=80 ECE No-ECE 59.1 50.0 Difference: 9.1 points **Significant p<.01	1974-75 Completion SFTAA N=56 ECE No-ECE Sig. Total 99.3 91.2 ** Non-Lang. 99.8 91.9 * Language 100.6 92.1 **	1975-76 Completion SFTAA N=40 ECE No-ECE Sig. Total 96.7 92.1 ... Non-Lang. 96.5 93.9 ... Language 97.3 92.3 ...
7th	1973-74 Peabody PVT Pre- 43.1 Post 57.6 Diff. 14.5 + Others	1974-75 Beginning Kuhlmann-Anderson N=120 ECE No-ECE 99.1 94.8 Difference: 4.3 IQ points **Significant p<.02	1974-75 Completion Metropolitan Readiness N=120 ECE No-ECE 56.9 55.0 Difference: 1.9 points Insignificant	1975-76 Completion SFTAA N=72 ECE No-ECE Sig. Total 88.9 93.4 ... Non-Lang. 87.6 95.1 ... Language 92.2 95.1 ...	1976-77 Completion
8th	1974-75 Peabody PVT Pre- 44.6 Post 57.6 Diff. 13.0 + Others	1975-76 Beginning Kuhlmann-Anderson N=100 ECE No-ECE 101.5 90.5 Difference: 11.0 IQ points ***Significant p<.001	1975-76 Completion Metropolitan Readiness ECE No-ECE 59.7 53.9 Difference: 5.8 points *Significant p<.05	1976-77 Completion	1977-78 Completion
9th	1975-76 Objectives Inventory + Other Measures	1976-77 Beginning	1976-77 Completion	1977-78 Completion	1978-79 Completion

*** Significant at the .001 level ** Significant at the .01 level (or at the .02 level, if so noted) * Significant at the .05 level ... Insignificant

difficult for teachers to individualize instructional plans and to meet the highly variable educational needs of children.

The post-kindergarten results this year, as measured by the same criterion test, the Metropolitan Readiness Tests, were minimally significant but re-established the expected pattern. However, their minimal significance and last year's findings do not lead to any easy conclusions to account for the inconsistencies. Another year's experience may contribute to a better understanding of the situation.

The Short Form Test of Academic Aptitude (SFTAA) Level 1, was used as the criterion measure for both first and second grades. Of major significance was the failure to find positive results for the effects of prior ECE experience for either grade. The first grade results are actually consistent with the negative post-kindergarten findings on the Metropolitan last year. That cycle of children had entered kindergarten functioning at a higher level then a comparable group of Non-ECE children but left kindergarten operating at approximately the same level. Thus it was not really unexpected to find that they continued to function at an equivalent level as their No-ECE counterparts at the end of the first grade. These results do confirm again, though, the critical importance of kindergarten in determining whether or not children who have been in the ECE program will be able to maintain their gains.

The second grade results are at variance with the positive first grade outcome last year. That cycle of ECE children had previously demonstrated superior performances on entry into and at the conclusion of kindergarten when compared with their No-ECE matches. It needs to be pointed out, however, that positive results have been obtained only twice in the 5 second grade cycles which have been evaluated, using several different criterion tests.

In view of the now lengthy 9 year history of the assessment program, it is appropriate to review the results of each of the cycles for summary purposes.

Table 31 provides a chronological history of each of the ECE cycles beginning with the 1967-68 school year, providing sample sizes, the tests administered and the results (excluding the ECE year which is too complex in size and detail to present in summary form), and their significance.

In over-all summary, the results of the 9 years' evaluations support the ECE Program both as an early remediation and preventive program so long as it is followed by other programs which, in turn, meet and challenge children at their individual skill and developmental levels and reinforce the skills and learning acquired in the ECE Program. Although programs of early intervention are a major factor in affecting subsequent school performance, short-term programs, no matter how well conceived or when introduced, cannot take the place of extensive alterations in policies and practices throughout the educational system. Pre-kindergarten education cannot take the place of improvements in elementary school education.

A review of the final summary table provides additional strong supportive evidence from the kindergarten results of the effectiveness of the ECE upon kindergarten performance. In general, most of the first grade results indicate continued superior performance of ECE experienced children, although by the second grade its impact has been considerably weakened and/or non-ECE children have caught up. Considering the myriad of uncontrolled and possible influential variables which intervene during kindergarten and the early primary years, viz., different schools and teachers, rates of attendance, mobility, environmental factors, personal and inter-personal factors, etc., it is even more surprising and impressive that the program has had such measurable, relatively long-term effects. It is impossible to anticipate the possible effects of the desegregation plan on these children.

Bereiter, in a critical, incisive article (4) expresses surprise that some pre-school interventions have shown significant effects for 3 years or more after the cessation of treatment. He notes the following.

"The wise strategy for the present would seem to be to look for elementary school programs that are more successful than the present ones at washing out the effects of differences in earlier school experience. This strategy does not, however, preclude the continued search for more effective methods of preschool education. On this matter we have to ask ourselves what increased effects we would want or have any reason to expect were possible." (4, p. 15-16, underlining not in original)

Later he notes:

"Only by joining preschool education with elementary school curriculum can we begin plausibly asking the potentially much more productive question: 'What things can we teach a child of four and five that can then be built upon in the first grade and after?' . . . The data on long-term effects of preschool intervention are disillusioning but not, to me at least, discouraging. The illusion that they serve to dispel is that there is some magic in the early years of intellectual development, such that a little difference there will make a lot of difference later. What we seem to be finding instead is that a lot of difference there may just possibly make a little difference later. Weakening of the 'magic years' illusion will, I hope, render more credible the position that Englemann and I have argued from the beginning, that learning in young children is just learning: some things can be taught to young children and some cannot; some of the things that can be taught will prove useful later and some will not; what will prove useful later is not determined by some innate chain of development but by the actual course of real-life events." (4, p. 16-17, underlining not in original)

Beilen raises still another major issue when he notes:

"The most disappointing fact to face about preschool compensatory education is the inability to live up to the high expectations set for it. (5, p. 165)

The issue is also stated by Bereiter in the article cited previously:

"To treat the eventual vanishing of preschool effects as failure is to imply either that preschool compensatory education is futile or that the effective method has yet to be discovered. Either of these conclusions could be true, but those who think they follow from current evidence are applying criteria of success to preschool education that are not applied in any other realm of human effort. They are asking the doctor for a pill they can take when they are ten that will prevent them from getting fat when they are fifty." (4, p. 13, underlining not in original)

Dr. Martin Deutsch, of the New York City Early Childhood Project, comments upon the matter in this way:

"...As our work has progressed, we have come to believe that although early intervention is of primary significance in affecting later school achievement, continuous and appropriately sequenced reinforcement in the grades is vitally important if the child is to maintain these gains throughout this school experience." (3, p.3, underlining not in original)

It is apparent from these few references drawn from a voluminous literature which by its size alone attests to the controversies that early childhood education is not a simple matter. It is much more than being "fer it or agin' it." It is more than proper motivation, enriched experiences or "freeing" children to learn. It is all of these and more combined in a complex mixture which we have only now begun to appreciate and about which we will learn only as we experiment in a dispassionate way and learn to substitute reason for polemics and emotional convictions.

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APPENDIX

EARLY CHILDHOOD EDUCATION EVALUATION RECORD

TEACHER _____ SCHOOL _____

TOTAL ENROLLMENT _____ DATE _____

NUMBER OF PUPILS WHO MET EACH OBJECTIVE

	1	2	3	4
PHYSICAL DEVELOPMENT				
The child is able to balance himself				
The child is able to identify the following major body parts: head, toes, eyes, back, nose, feet, elbows, ears, legs, mouth, fingers, shoulders				
The child is able to state or demonstrate the uses of the following major body parts: eyes, ears, nose, mouth fingers, legs				
The child is able to: run				
jump				
hop				
The child is able to copy the following geometric shapes: horizontal line				
circle				
square				
PERSONAL IDENTIFICATION SKILLS				
The child responds to first name				
full name				
The child is able to state first name				
full name				
The child is able to state his age				
The child is able to state his address				
VERBAL SKILLS				
The child is able to express ideas in simple sentences				
The child is able to express ideas and feelings to peers				
The child is able to express ideas and feelings to adults				

	NUMBER OF PUPILS WHO MET EACH OBJECTIVE			
	1	2	3	4
VERBAL SKILLS continued				
The child is able to describe objects, events, and relations verbally				
The child is able to tell a story or event in sequence				
LISTENING SKILLS				
The child is able to listen in order to follow directions, repeat numbers or a sequence				
The child is able to concentrate in order to answer questions about verbally presented materials				
The child is able to identify familiar sounds				
The child is able to duplicate varying sound patterns				
VISUAL SKILLS (PERCEPTION AND MEMORY)				
The child is able to recognize his printed first name				
The child is able to recognize his printed complete name				
The child is able to recognize likenesses and differences				
The child is able to recall what he has seen				
The child is able to relate pictures, photographs and models to real things, places				
The child is able to classify according to shape, size, materials				
The child is able to match, compare, and arrange objects in order along same dimension				
The child is able to match the following:				
Red				
Yellow				
Blue				
Green				
Purple				
Orange				

VISUAL SKILLS (PERCEPTION AND MEMORY) continued	NUMBER OF PUPILS WHO MET EACH OBJECTIVE			
	1	2	3	4
Black				
White				
Brown				
The child is able to identify the following colors by name:				
Red				
Yellow				
Blue				
Green				
Purple				
Orange				
Black				
White				
Brown				
The child is able to name some letters of the alphabet				
WRITING SKILLS				
The child is able to print first name				
The child is able to print full name				
SPATIAL RELATIONS				
The child is able to fit objects together according to a plan or pattern				
The child is able to rearrange objects in space (blocks, color cone, nesting toys)				
The child is able to describe the positions of objects in relation to each other (over, under, top-bottom, inside, outside, next, beside, behind)				
The child is able to locate areas and objects in the classroom				
TEMPORAL RELATIONS				
The child is able to plan and complete what he plans				
The child is able to use certain time units in talking about past and future events (morning, afternoon, evening, day, night, today, yesterday, today, tomorrow, hour, week)				

MATH SKILLS

NUMBER OF PUPILS WHO MET EACH OBJECTIVE

	1	2	3	4
The child demonstrates a knowledge of simple vocabulary big				
little				
many				
few				
first				
last				
middle				
more				
less				
The child is able to do one-to-one matching with concrete objects 0-5				
6-10				
The child is able to use number words sequentially when counting				
The child is able to tell how many in concrete group of objects after counting				
The child is able to match the following shapes: circle				
square				
triangle				
rectangle				
other				
The child is able to identify the following shapes by name: circle				
square				
triangle				
rectangle				
other				
The child is able to identify the following numerals by name: 0				
1				
2				
3				

MATH SKILLS (continued)

		NUMBER OF PUPILS WHO MET EACH OBJECTIVE			
		1	2	3	4
The child is able to identify the following numerals by name: (con'd)	4				
	5				
	other				
The child is able to copy the following numerals:	0				
	1				
	2				
	3				
	4				
	5				
	others				